

## Section 4.4 & 4.5 Algebraic Models

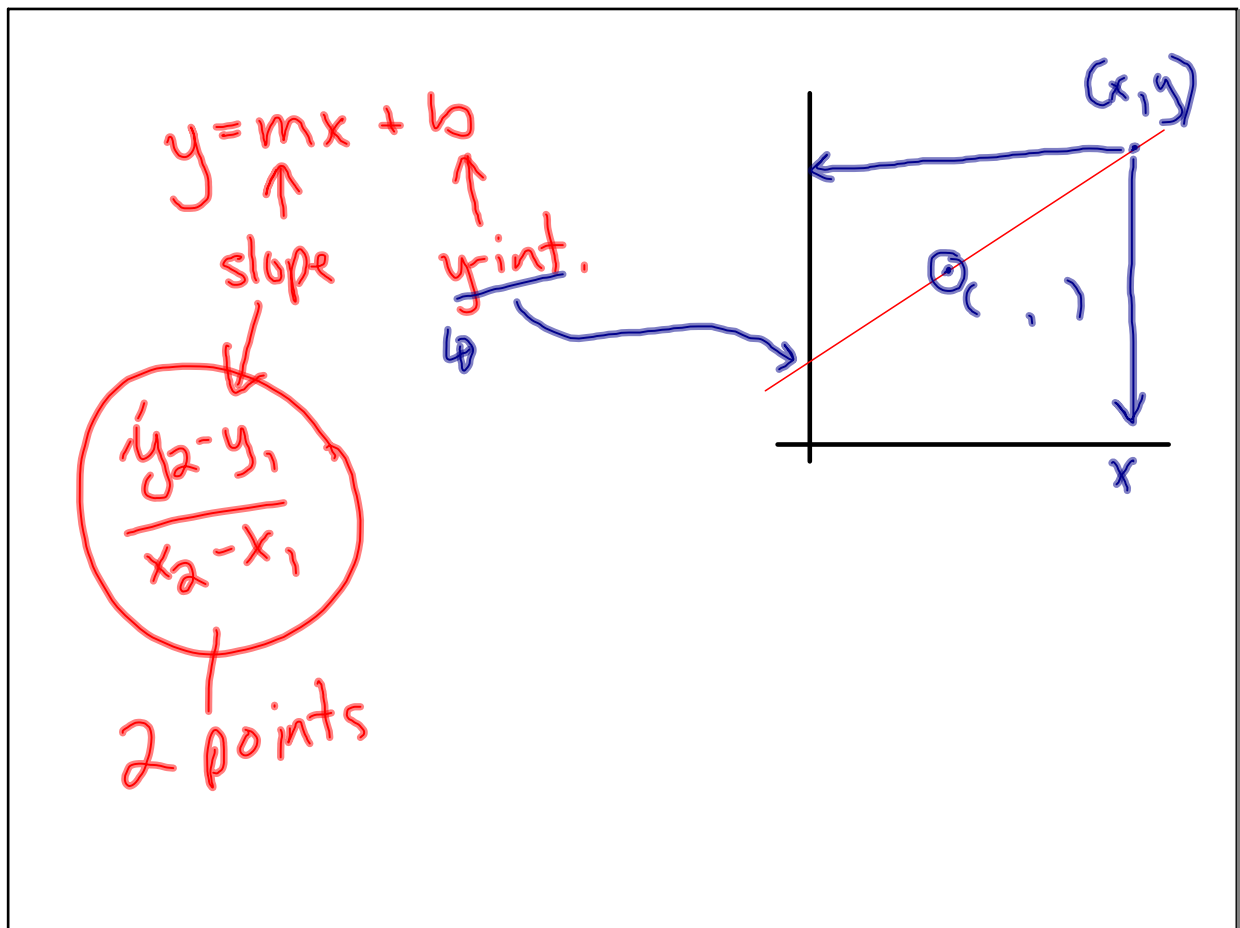
Feb 26-8:38 AM

Complete the following:

Pg.190 Investigation #4

- Complete the procedure and its questions
- Do questions investigation questions #1-5

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**Focus 11**

If the data seem to show a linear trend, you can produce a best-fit line for the data. Now you will develop a process to find a best-fit line called the median-median line.

**How to create a median-median line:**

**Step 1:** Construct a scatter plot for the data

**Step 2:**

- Divide the data points into 3 groups (each having about the same number of points)
- If they don't divide evenly, divide the points so that the two outer groups have the same number of points.

**Step 3:**

- Find the summary point for each group
- The summary point is one point that best "represents" all the points in a group of data. Its x-coordinate is the median of the x-values and its y-coordinate is the median of the y-values.

**Step 4:**

- Draw a faint line through the outer summary points. Find the slope of that line (using the two points that you've connected).

**Step 5:**

- Move the line in step 4 one third of the way towards the middle summary point, keeping it parallel. This is the median-median line.

**Step 6:**

- Find the equation of the median-median line.
- use the same slope as step 4
- you need to find the y-intercept by using the equation  $y = mx + b$  (fill in the slope (m) and choose one of the points that you used to find slope (x,y) and fill this in for the x and y values and then solve for b).
- fill in  $y = mx + b$

Please refer to page 192 for the example

**Handwritten notes on the page:**

#7 8.194  
#7

2 slopes →

Time (min) 0 2 33

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### Step 3

Group 1

x-values 3 5 9 11 13

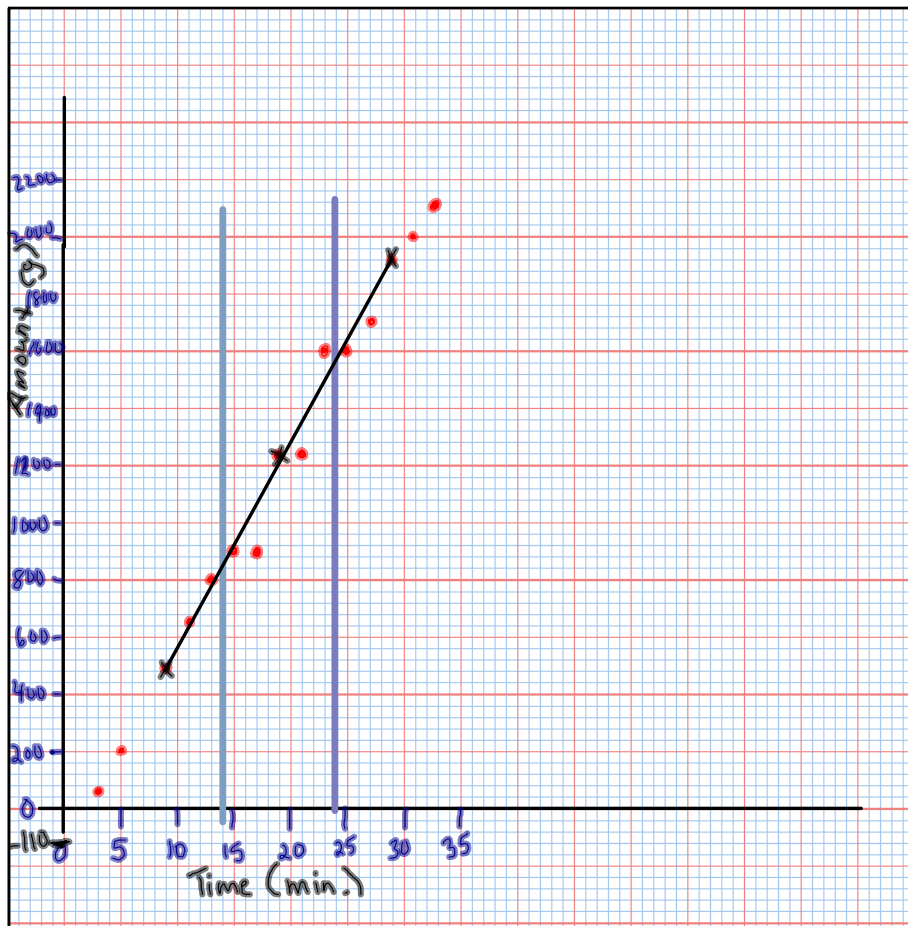
median = 9

y-values 50 200 500 650 800

median = 500

Summary Point (9, 500)

Mar 10-9:35 AM



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Summary Points:

- Group 1: (9, 500)
- Group 2: (19, 1250)
- Group 3: (29, 1900)

Join Summary Points 1 + 3

Slope:  $\frac{y_2 - y_1}{x_2 - x_1} = \frac{1900 - 500}{29 - 9} = \frac{1400}{20} = 70$

$y = mx + b$

$500 = 70(9) + b$

$500 = 630 + b$

$-130 = b$

$y = 70x - 130$

① 3 summary points  
 ② Find the slope (1st + 3rd sum. point)  
 ③ Fill in slope & one point ( $y = mx + b$ )  
 Solve for b

Pg. 194 #8

	G1	G2	G3
d			
x	20		
y	30		
	39		
	40		
	45		

(70, 40)

part b

$y = 0.2x + 26$

$y = 0.2(270) + 26$

$y = 54 + 26$

$y = \$80$

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Pg. 194 #8

Distance (x)  
Cost (y)

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## Classwork/Homework

Pg.193 # 8,10

AND find the equation of the median-median line of the manatees data from investigation 4 (don't need to graph this one, as you have already graphed it)

(take your time and do it correctly,  
use graph paper and a pencil)

-everyone should end up with the same equations if you've followed the steps given!

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### Using the graphics calculator to determine the equation of the median-median line

#### Step One:

- Enter the 3 summary points into two lists (one for the x values and one for the y values)

#### Step Two:

- Go to STAT, then CALC, then press enter on the med-med (#3)
- right after the med-med, enter the two lists that you entered the data.

The equation will come up.

Practice by entering the values that you got for #7 and then check #8 as well.

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### Linear Regression using the graphics calculator

#### Step One:

- Enter the data into your lists

#### Step Two:

- Go to STAT, then CALC, then press enter on the LinReg (#4)
- right after the LinReg, enter the two lists that you entered the data.

The equation will come up.

Another value should also come up (r and/or  $r^2$ ):

This is called the correlation coefficient

A number that describes how well a line models the data. The closer to 1 or -1 the coefficient is, the stronger the correlation. A correlation that is positive means that as one variable increases, the other increases, resulting in a positive slope.

A correlation that is negative means that as one variable increases, the other decreases, resulting in a negative slope.

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### Investigation 5 Pg.195

(see handout)

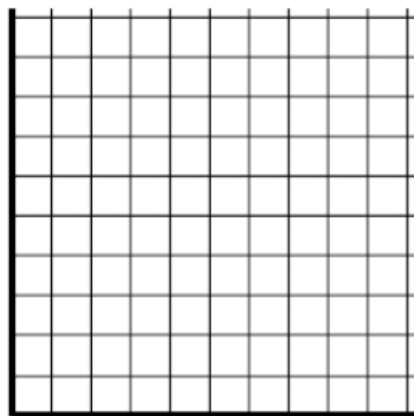
- Plot each scatterplot
- use the graphics calculator to do linear regression on each set of data.

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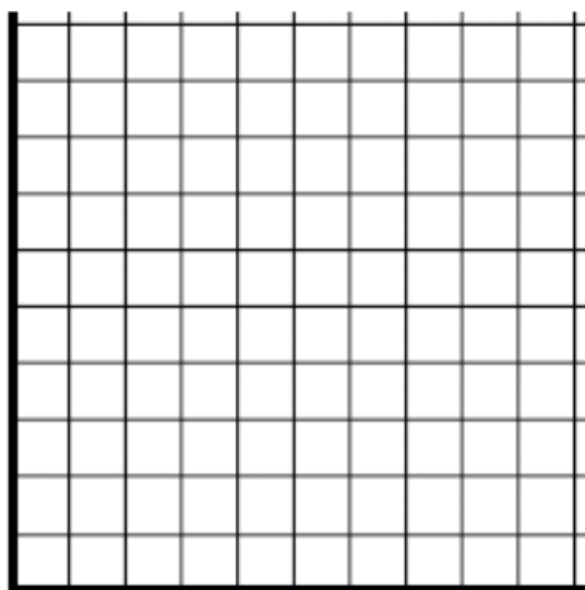
**Investigation 5 Picking Margot's Problem**

Name: \_\_\_\_\_

Graph each of problems below, and then using the graphics calculator state the equation of the line for each scatter plot. In order to write the equation of the line you will need to enter the data into your graphics calculator and use the stats function "linear regression". Label each graph with Dependent and Independent Variables; proper numbers on each axis. See Problem 1 for an example. ( $y = mx + b$ )

**Problem 1****Tossing a Coin**

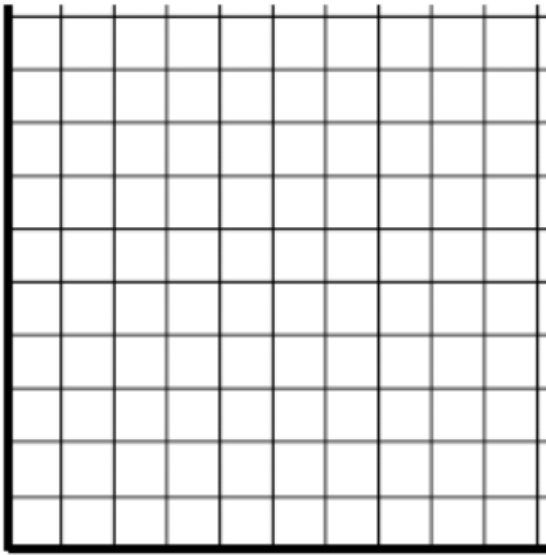
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**Problem 2****Rolling the Dice**

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### Problem 3

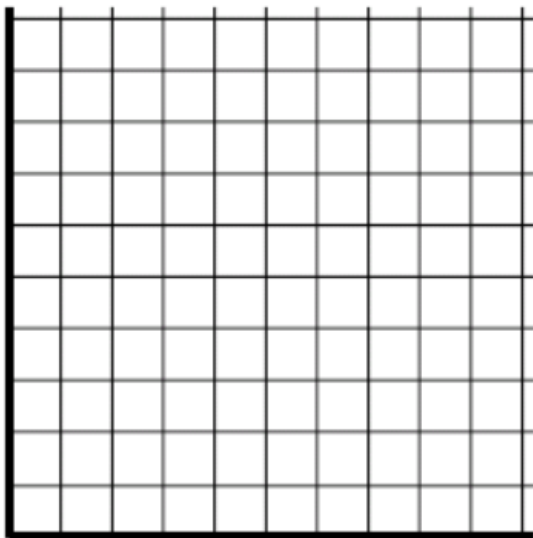
#### Monkeys helping the disabled



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### Problem 4

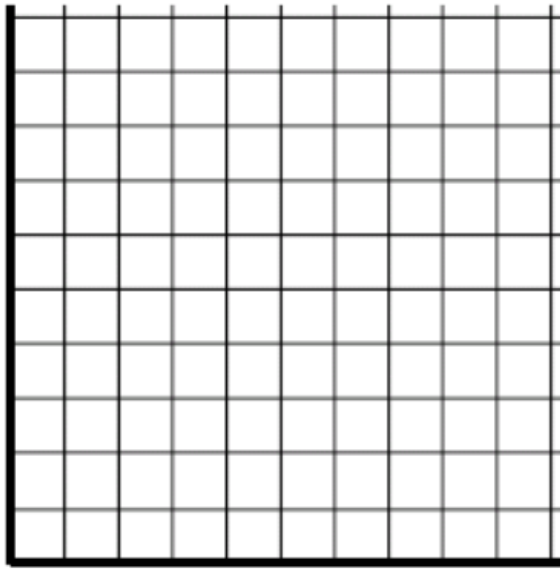
#### Movie Attendance



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**Problem 5**  
**Swans**



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For each of the problems state the equation for each  
as well as the correlation coefficient.

1. \_\_\_\_\_  $r =$  \_\_\_\_\_
2. \_\_\_\_\_  $r =$  \_\_\_\_\_
3. \_\_\_\_\_  $r =$  \_\_\_\_\_
4. \_\_\_\_\_  $r =$  \_\_\_\_\_
5. \_\_\_\_\_  $r =$  \_\_\_\_\_

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